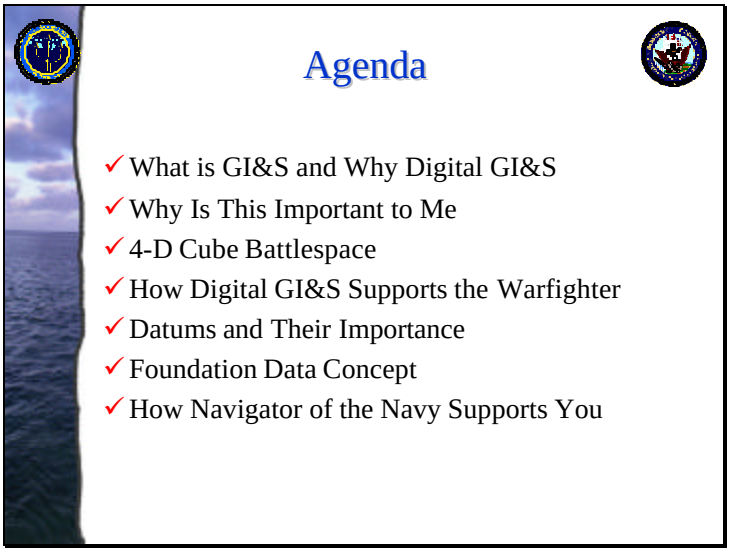
Slide 1

This briefing will serve as the GIS Road Show Briefing. The purpose is to spread the word on what GI&S is and how it serves the warfighter

Slide 2


Agenda
✓What is GI&S and Why Digital GI&S
✓Why Is This Important to Me
✓4-D Cube Battlespace
✓How Digital GI&S Supports the Warfighter
✓Datums and Their Importance
✓Foundation Data Concept
✓How Navigator of the Navy Supports You

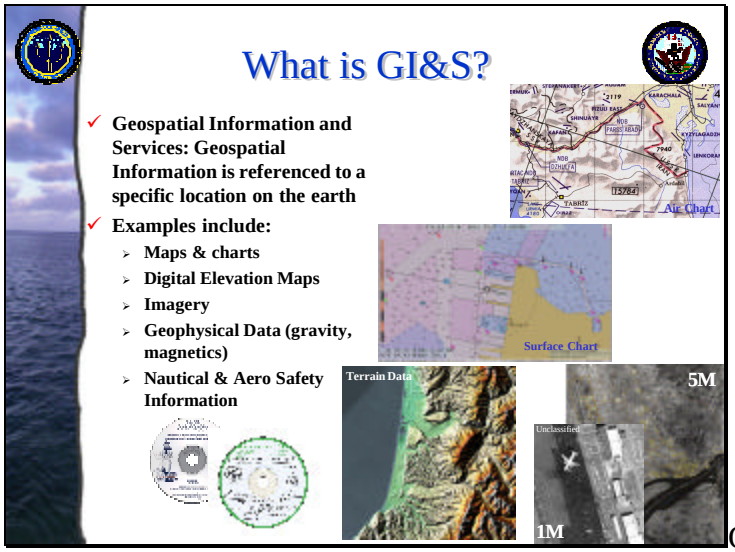
Slide 3

Legacy - Analog paper charts, manual plotting - less efficient employment of data

Today - Still in a mostly paper environment, but moving slowly towards digital

Beyond - Totally digital environment. Near future will include both smart and dumb digital information, but all will be digital and thus more efficient.
Integrated digital environment to create interoperability
More efficient data transfer/update
Increased flexibility and utility of information - supports COP/SIAP

Slide 4



GI&S refers to the information and services that are associated with it: maps, charts guides, Notice to Mariners and Pilots, help desks, web-based availability of products, DLA, etc.

GIS now has two different meanings:

Geospatial Information Systems: these include the hardware and software that manipulate the Geospatial Information: systems (FUND, ECDIS-N, Workstations, etc.) and exploitation tools(JMTK, Falcon View, ArcInfo, etc.)

Geographic Information Systems: refers to the Navy-wide system proposing to be the database for environmental data (marine mammal data, METOC information, NOAA data, etc.)

Sample GI products:

Jet Navigation Chart - Aeronautical product 1:2,000,000 scale

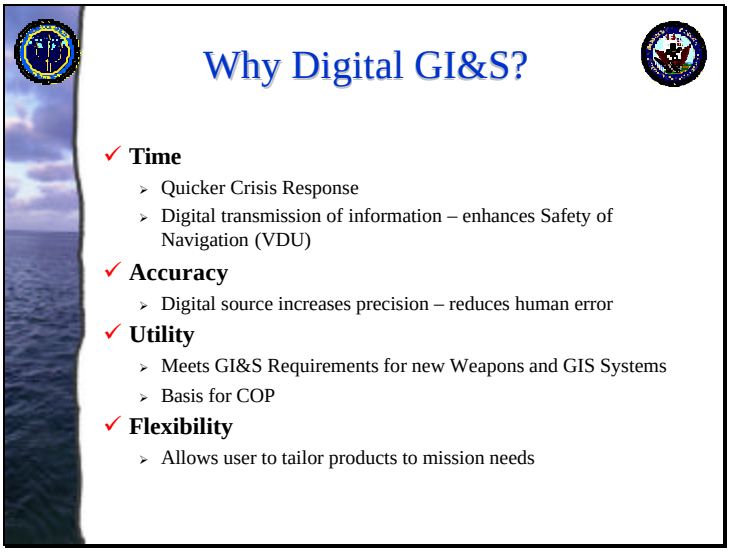
Digital Nautical Chart - scale varies according to chart type: Harbor/Approach, Port, etc.

Digital Terrain Elevation Data Level 2 - 30 meter posting, shows 3-d relief

Controlled Image Base - both 5-meter and 1-meter; a satellite image that has been georeferenced to the earth

CD-ROMs - to illustrate that the notices and products are available in digital format

Slide 5



Time

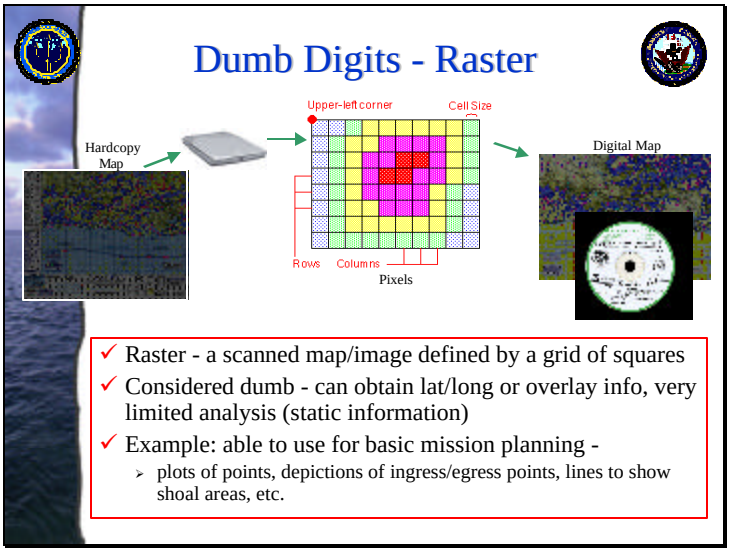
Quicker Crisis Response - automated transmission of data in a crisis will facilitate getting information to the fleet. This will be the exception rather than the rule as the intent is to deploy with what you need in CD-ROM format.

VDU - updates associated with Notice to Mariners will be the critical part of electronic navigation; VDU will allow for a near-realtime update of the digital charts used for navigation.

Accuracy – smart digital products provide ability to capture full positional data; hardcopy products are limited by scale and symbology

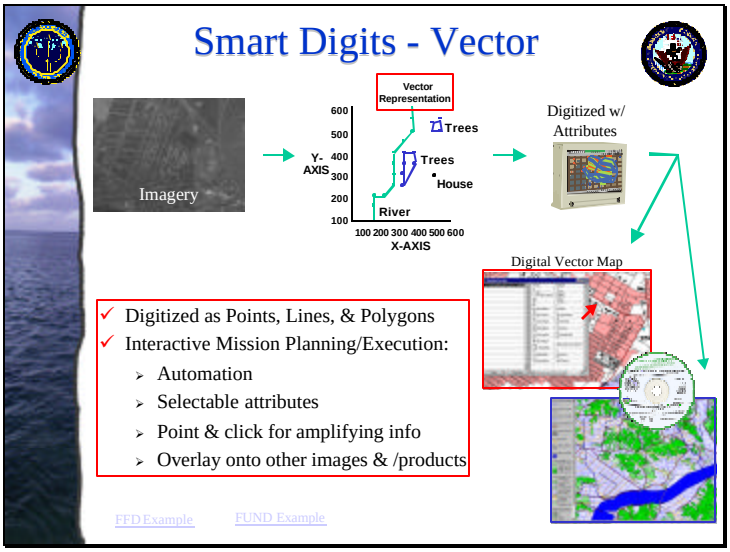
Utility – digital GI forms the basis for the Common Operational Picture and Common Relevant Operational Picture; offers flexibility to tailor information to display only what you need for the mission

Slide 6



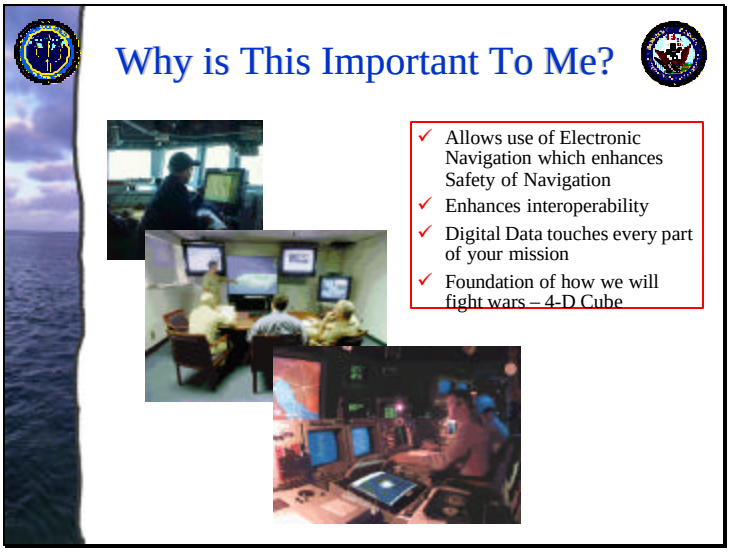
Raster is just a photo of a map or image captured in a digital environment. It is only as good as the scale of the item scanned.
A static form of digits – not nearly as powerful as vector

Slide 7

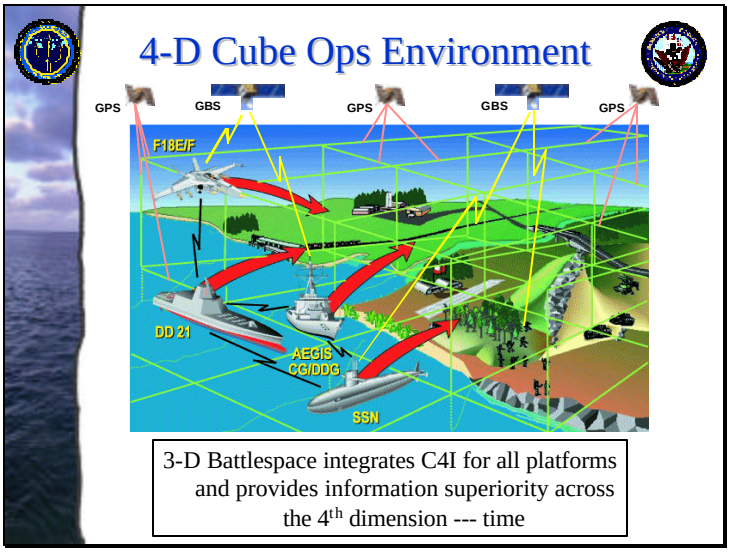


Shows that an image is digitized by identifying areas by points, lines or polygons vice scanning the image.
Hyperlinks are as follows:
FFD is a Foundation Feature Data example to show Point & Click attributes available for mission planning
FUND Example is one that shows how you can “automate” a DNC to show buoys and shoal water approaching.

Slide 8

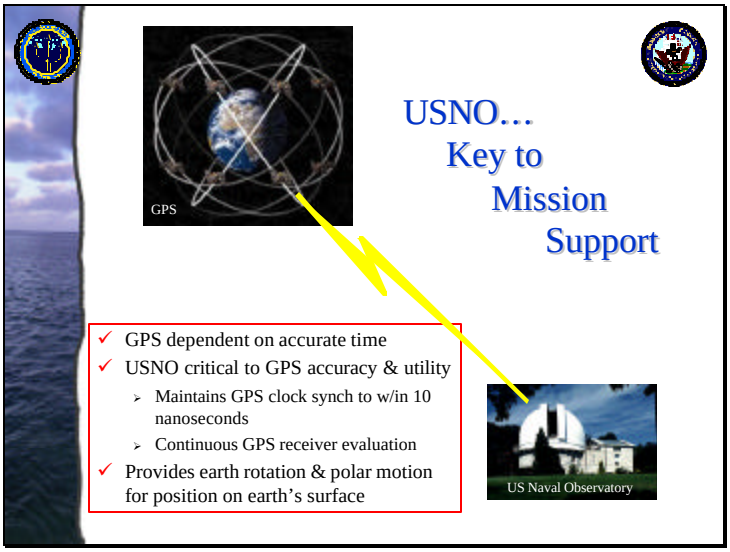

Why is This Important To Me?
✓ Allows use of Electronic Navigation which enhances Safety of Navigation
✓ Enhances interoperability
✓ Digital Data touches every part of your mission
✓ Foundation of how we will fight wars – 4-D Cube

Slide 9



This is still a work in progress - looking for a better representation! Supposed to depict the 3-D Battlespace with the addition of the fourth dimension of time. This shows the interoperability of platforms and shore-based units, receipt of information and communications between units, and GBS satellite connectivity for exchanging information. Continuity and update over time adds the fourth dimension.

Slide 10

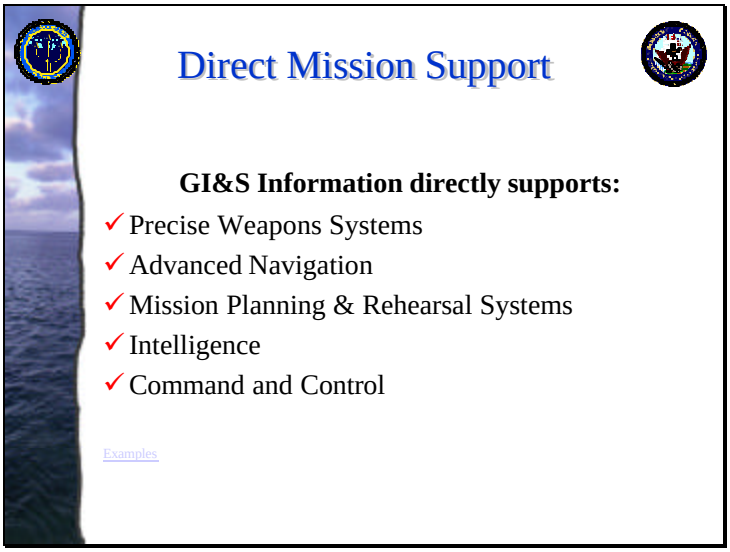


GPS verifies orientation to the earth by using nearby stars and bases that position on the precise measurements provided by USNO. GPS accurate location relative to the earth plus accurate time synchronization is critical to GPS users for accurate positioning.

USNO continuously monitors GPS receiver stations and evaluates time synchronization to within 10 nanoseconds. The GPS is limited to no better than 10 nanoseconds; however, if improved, USNO could provide a synchronization to within 1 nanosecond.

Accurate measurements of earth rotation and polar motion are essential to being able to effectively locate your position on the surface of the earth.

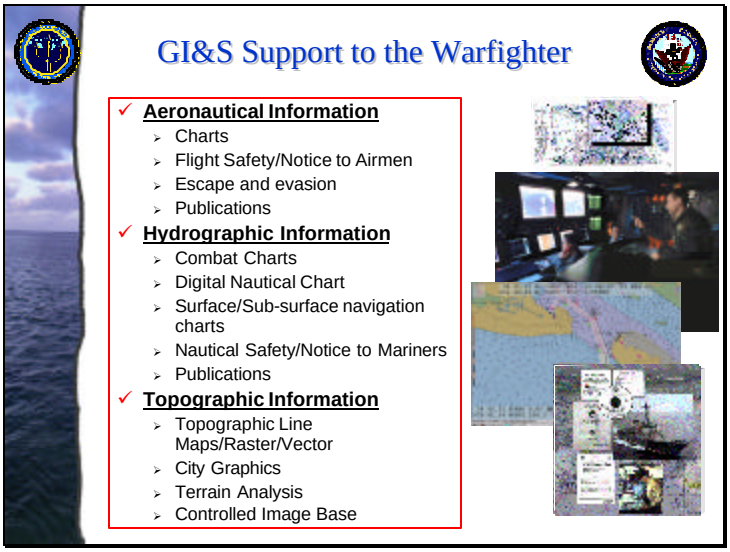
Slide 11



This slide is hyperlinked to another that lists weapons systems for each category. The following slides visually depict how GI&S supports the warfighter.

This slide and the following three show more specific examples of how GI&S directly affects the mission and the warfighter.

Slide 12



Support to the Warfighter slides focus on various areas that digital GI aid in mission planning and execution. This slide shows examples of "products" available that audience should recognize. Addresses the 3 basic categories: Aeronautical, Hydrographic and Topographic.

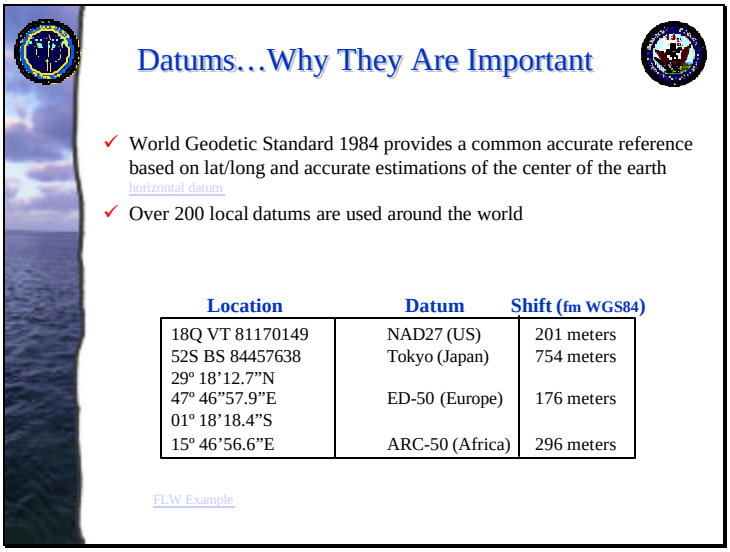
Slide 13

Targeting is a critical example of GI&S support to the warfighter.
DPPDB is an intelligence product as well as one used for precision in locating target coordinates. It is a stereo image used on high end workstations.
Precise Point Coordinates can be depicted on Aim Point Graphics in the form of kneeboards for pilots
TERCOM for Tomahawk
Gravity for subs to use to aid missile trajectory and pilots to use for Safety of Navigation

Slide 14

Training and Model & Simulation are also critical tools for understanding how GI&S can effectively be used/demonstrated. Training cannot be overstated!
Mission Planning will be the most common use for GI&S throughout the fleet.
GCCS-M will have Geospatial Information as the common foundation for the COP/CROP
Common Operational Picture: common throughout the fleet
Common Relevant Operational Picture: common for your location/AOR or your operation
Added Precise Time and Astrometry as these are essential mission planning tools for location and also targeting. Many systems access GPS or position themselves relative to stars and/or earth. USNO is key provider/manager of precise time and astrometry information.

Slide 15

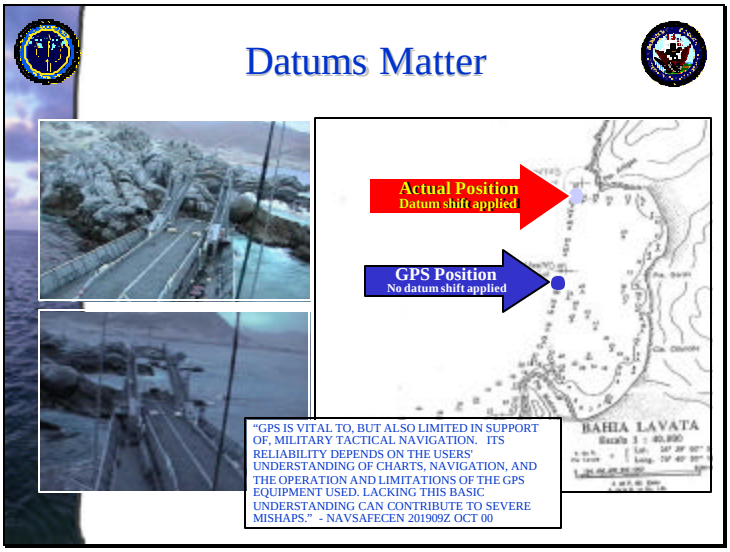


Hyperlink to horizontal datum will show a cartoon of a horizontal datum ellipsoid and explain that it represents a close approximation of the earth. In addition, it will show the "potato" view of the earth from ERS-1 showing earth without water or clouds – point is that in order to have a worldwide horizontal datum (WGS84) you need an accurate approximation of the center of the earth. Any customer can ask NIMA to transform a foreign datum and produce a DNC (they are able to convert over 200 local datums). This eliminates any doubt for using the digital product.

The table shows what the shift in meters would be if WGS84 were applied to another datum (to highlight errors that would be possible if the wrong datum were used with a WGS84 system).

FLW hyperlink is the Fort Leonard Wood depiction of the same intersection on two different datums: NAD27 and WGS84.

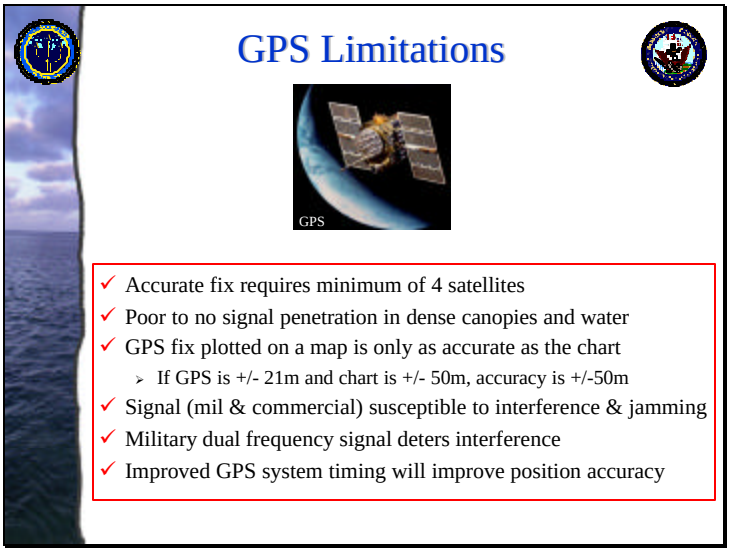
Slide 16



The key is now visible on the chart to further emphasize that the datum was not WGS84. Positions indicate what the ship estimated using GPS without shifting to WGS84 and where they really were when the WGS84 datum shift was applied.

In reality, the ship had a chart with no indication of what datum it was based upon and used it in a WGS84 environment (GPS positioning). Without applying the shift to WGS84, they thought they were in good water.

Slide 17



Nominal fix also requires an even spread of the 4 satellites, >15º from horizon and < XXº from nadir.

Although both military and commercial signals are now available, don't be fooled into using the commercial one with your COTS situational awareness system…it is more susceptible to interference! In addition, once establishing a P-Code lock, you can usually hold it even in a jamming environment.

P-code: Precision Code used by the military; provides a dual frequency capability to help prevent interference and jamming. Available on L2 carrier.

CA-code: Course Acquisition code used by commercial systems although P and CA are available on the L1 carrier.

Use of COTS systems may increase interference and degrade GPS signals if using CA-code. Some ship groundings have been attributed to this!

Figure of Merit: GPS receiver calculates a FOM as an indicator of expected positioning accuracy. It is a confidence-level indicator dependent on the quality of your fix (number of satellites, spread of the satellites, angle off horizon, signal quality, etc.). It does not equate to a numerical value of meters of error, just a good idea of whether you have a good fix or a bad one.

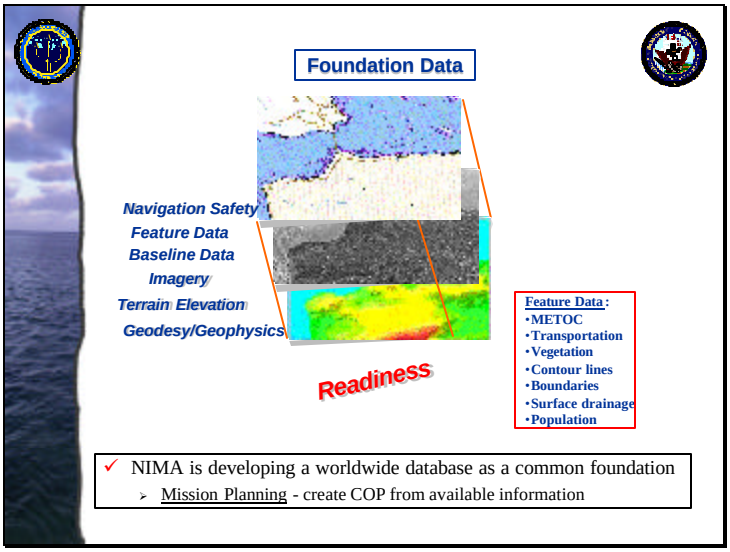
Slide 18

Tactical Tomahawk
JSF X-35 Joint Strike Fighter
USS Virginia Class
CVNX – next generation carrier
DD21 – USS Zumwalt

Integrated COP/SIAP refers to the interoperability piece and being able to share information to maintain COP

Total Force Interoperability throughout Joint Forces - correlated with JV2020

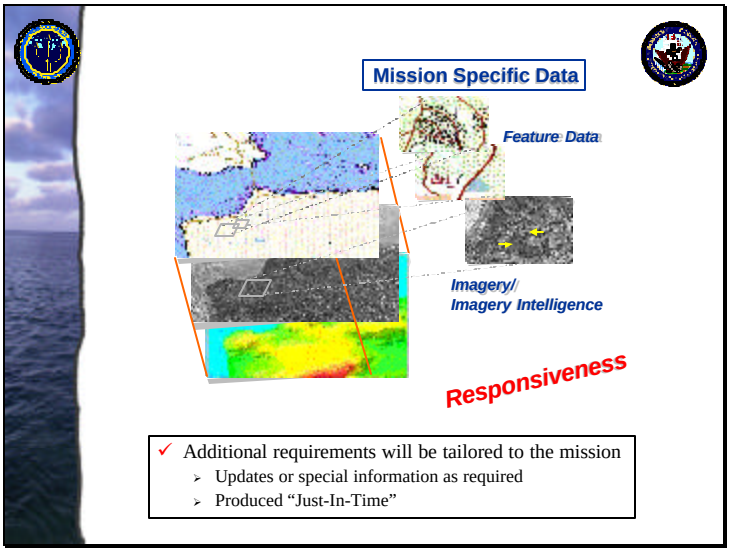
Slide 19



This is a depiction of foundation data. Foundation Data is made up of: DTED2, CIB-5 meter, Hydrographic Information, Aeronautical Information Foundation Feature Data (FFD) which contains thematic layers of data: METOC, transportation, vegetation, contour lines, boundaries, surface drainage, and population
Readiness addresses those requirements which we can request NIMA produce for mission planning and training

This is the information we should have on the shelf to use for mission planning

Slide 20

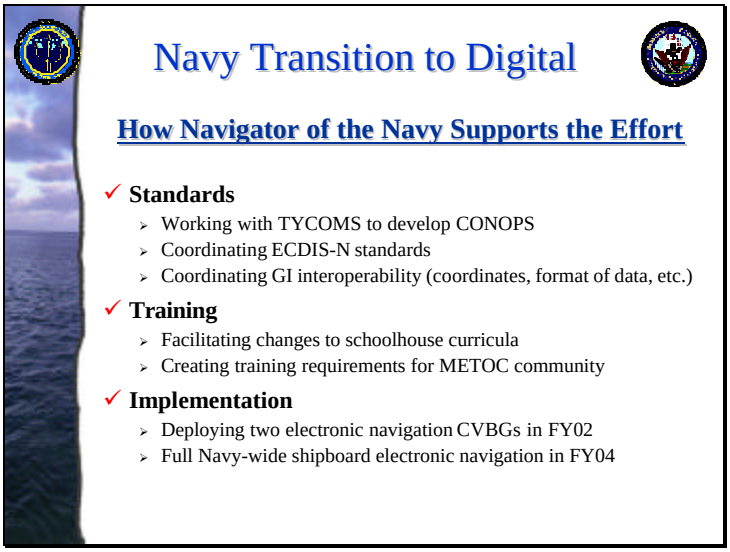


Mission Specific Data Sets (MSDS) are a densification of data/information tailored to your mission needs

Responsiveness requirements address needs in time of crisis/just-in-time

Note: There can be MSDS requirements that fall under readiness. These would, for example be in hot spots where the possibility of crisis is always present.

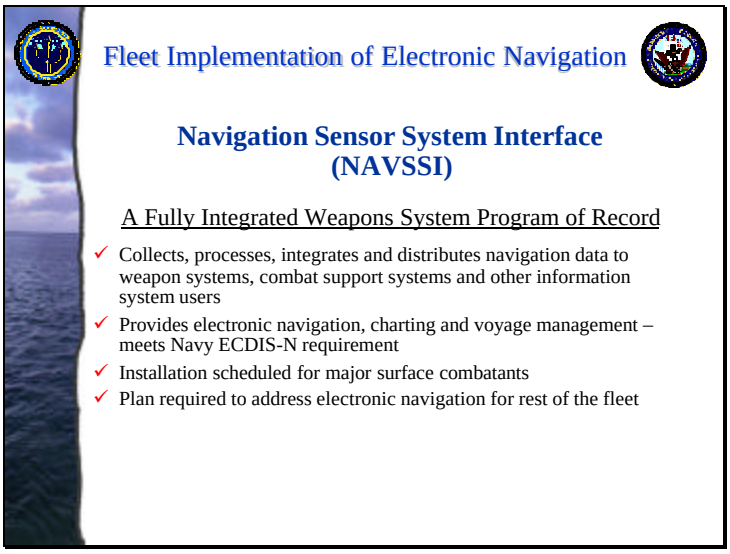
Slide 21



Training

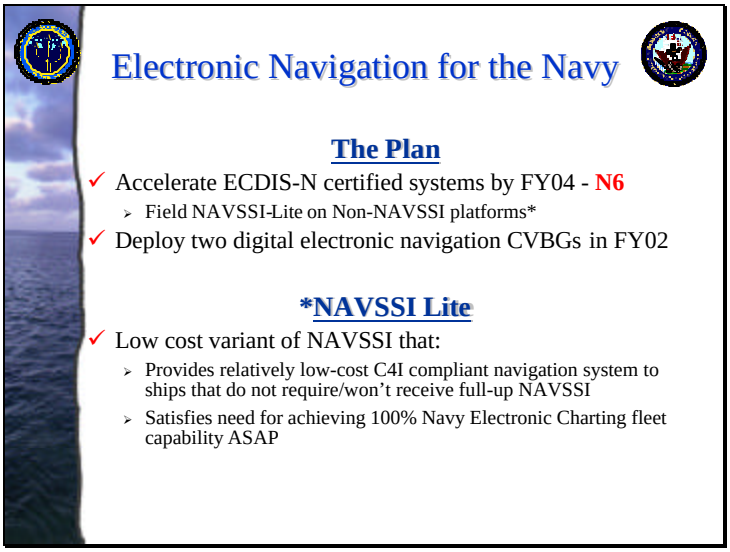
Schoolhouse curricula and DMS courses include:
electronic navigation
hands-on use of GIS systems
understanding GI data
Mobile Training Team Support
METOC Community
Changing personnel training codes to mandate DMS Courses for CINC GI&S Billets
Facilitating additions to JMTAC, DMS, Boat School, and Post Graduate School courses

Slide 22

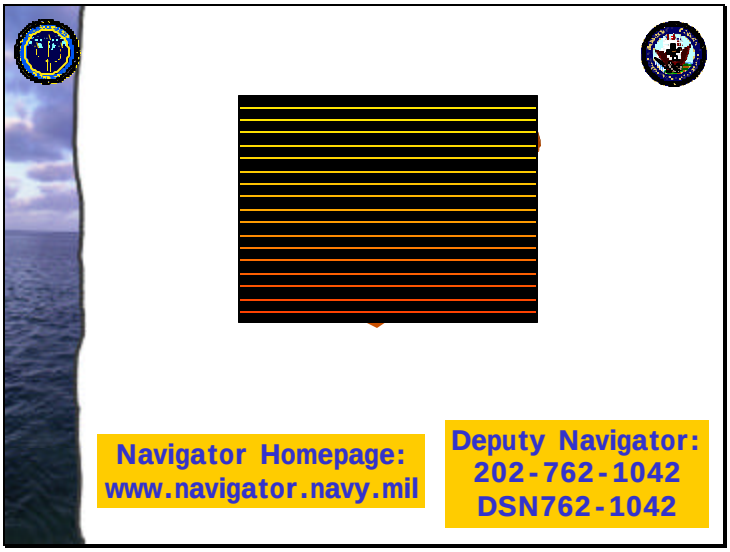


Notes on NAVSSI from NAVSSG Brief:
Make It Reasonably "Off the Shelf"; Leverage/Repackage Existing Designs
Get It to the Fleet fast, inexpensive and on a Path to ECDIS-N
Roughly 90 Ships by FY 04.
$6.3M in currently available resources
Readily Upgraded to ECDIS-N With Software and Add-ons ---No Ripouts
Acceleration (~240 ship by FY04) is possible but requires an additional $15.75M in OPN and and $5.4M in RDT&E in the POM cycle

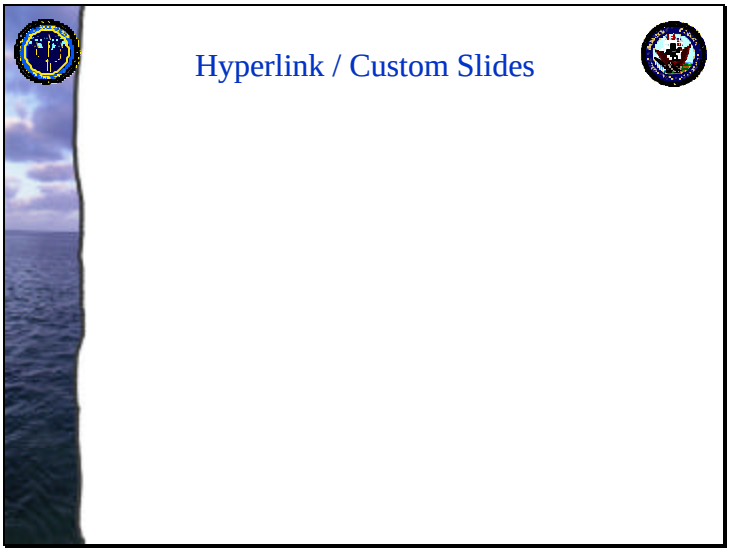
Slide 23


Electronic Navigation for the Navy
The Plan
✓ Accelerate ECDIS-N certified systems by FY04 - N6
➢ Field NAVSSI-Lite on Non-NAVSSI platforms*
✓ Deploy two digital electronic navigation CVBGs in FY02
*NAVSSI Lite
✓ Low cost variant of NAVSSI that:
➢ Provides relatively low-cost C4I compliant navigation system to ships that do not require/won't receive full-up NAVSSI
➢ Satisfies need for achieving 100% Navy Electronic Charting fleet capability ASAP

Slide 24

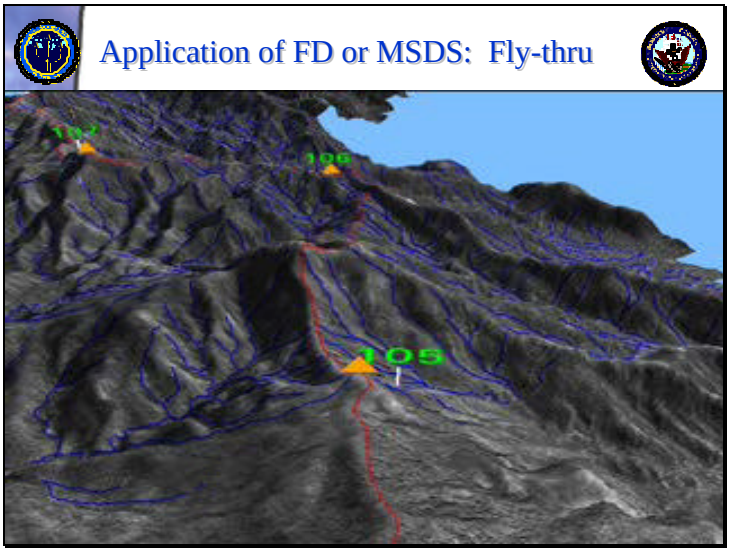

Navigator Homepage:
www.navigator.navy.mil
Deputy Navigator:
202-762-1042
DSN762-1042

Slide 25



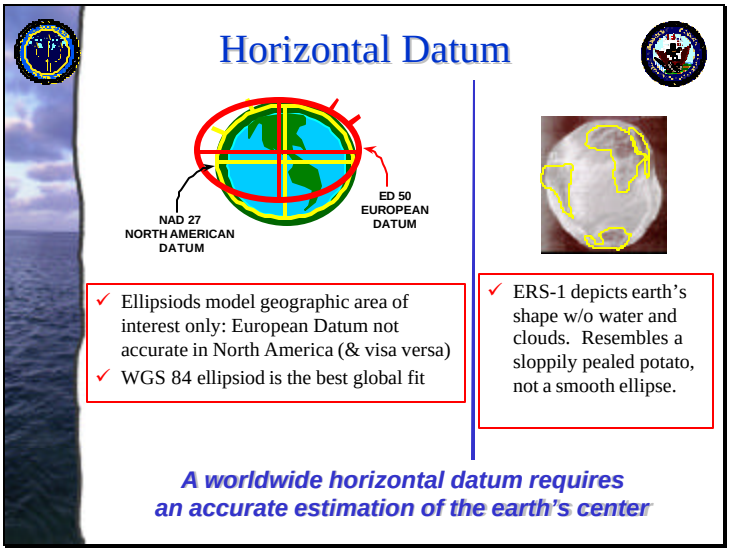
Hyperlink slides tie to the brief. In addition, there will be additional slides developed to address specific audiences to enable a more tailored brief…ongoing effort!

Slide 26



This is a fly-through of Peru that shows CIB (imagery) draped over DTED.

Slide 27

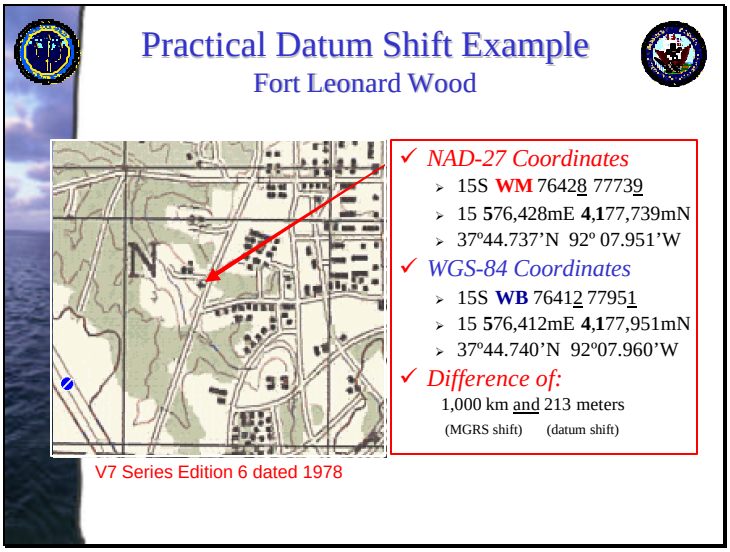


Practically every country in the world has created their own system at some time in the last few hundred years. All of these individual systems produce completely incompatible coordinates. In this example (highly exaggerated for visual effect), the Europeans, who use the European Datum of 1950 (ED 50) (Potsdam), have created a system which models their area of the world, but does not agree with the model that fits North America. The European ellipsoid is bigger and flatter than ours, and their initial point is outside of a university in Potsdam.

As long as all maps and surveys in an area use the same system, there is no problem. But any weapon with a global range will now have a tough time figuring out which system to use in which area. Notice that we don't agree on the location of the center of the Earth.

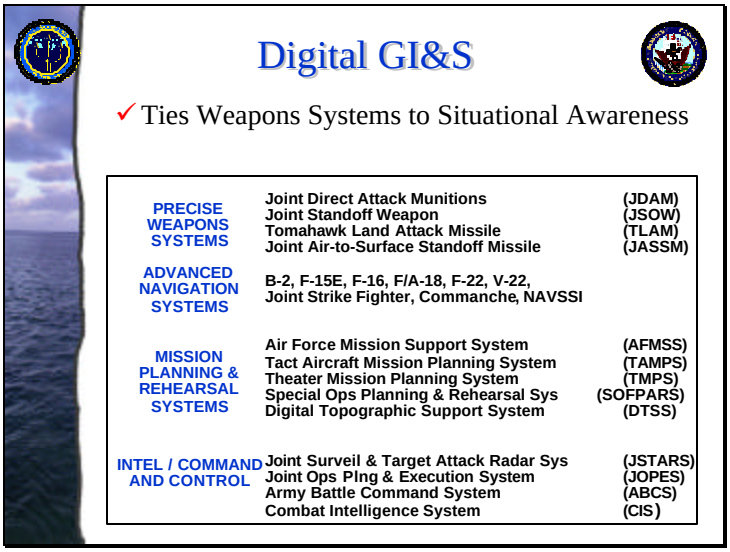
WGS 84 is the best global ellipsoid fit. This is the accepted common reference standard used worldwide now.

Slide 28

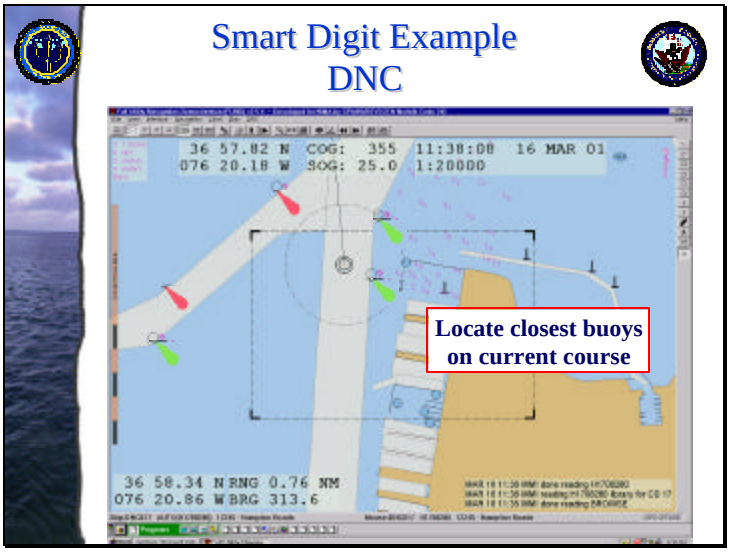


This example looks at the same intersection on a NAD27 and WGS84map, comparing the difference in locations picked off of the maps in various coordinates.
Coordinates are:
Military Grid Reference System (MGRS)
Universal Transverse Mercator (UTM)
Latitude/Longitude
The difference of 1000km is due to the following:
The old MGRS system was based on older ellipsoids developed prior to the advent of WGS72 and WGS84. The new MGRS grid for WGS84 is based upon newer ellipsoid models plus a huge shift so as not to confuse users. The 1000km shift depicts the difference between using the old and new MGRS system. Shifting the second letter of the 100,000 meter grid zone designator by 10 letters equates to 1000km (WM to WB equates to 1000km).
The 213 meter difference equates to the difference in shifting from NAD27 to WGS84. There is typically a 210 meter shift in the north-south direction when comparing NAD27 and WGS84

Slide 29


Digital GI&S
✓ Ties Weapons Systems to Situational Awareness
PRECISE WEAPONS SYSTEMS
Joint Direct Attack Munitions (JDAM)
Joint Standoff Weapon (JSOW)
Tomahawk Land Attack Missile (TLAM)
Joint Air-to-Surface Standoff Missile (JASSM)
ADVANCED NAVIGATION SYSTEMS
B-2, F-15E, F-16, F/A-18, F-22, V-22,
Joint Strike Fighter, Commanche, NAVSSI
MISSION PLANNING & REHEARSAL SYSTEMS
Air Force Mission Support System (AFMSS)
Tact Aircraft Mission Planning System (TAMPS)
Theater Mission Planning System (TMPS)
Special Ops Planning & Rehearsal Sys (SOFPARS)
Digital Topographic Support System (DTSS)
INTEL / COMMAND AND CONTROL
Joint Surveil & Target Attack Radar Sys (JSTARS)
Joint Ops Plng & Execution System (JOPES)
Army Battle Command System (ABCS)
Combat Intelligence System (CIS)

Slide 30

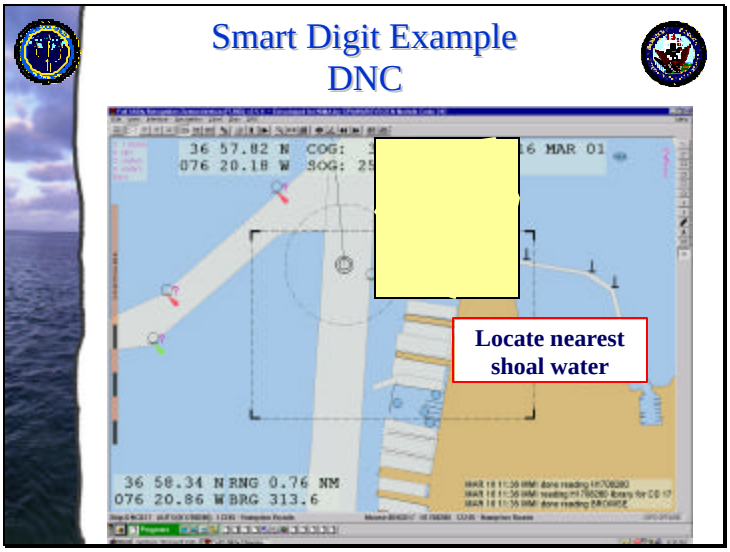


This and the next slide came from a FUND scene of DNC. This illustrates how you can use/manipulate vector data. Buoys can blink as you approach, shoal water areas can blink in warning as you reach an identified distance from them, etc.

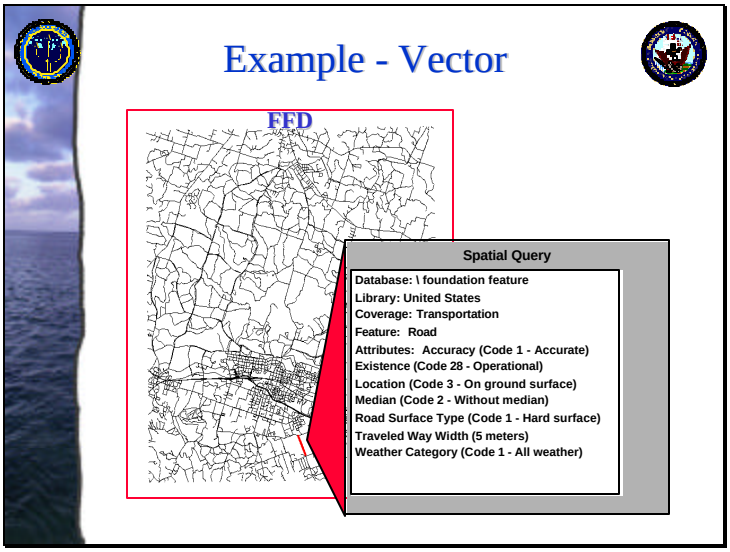
Users can automatically receive warnings of danger zones/areas of interest as you approach them using electronic navigation systems.

Hyperlink currently set to blink 9 times, then stops; you must forward to the next slide to get to the shoal water example.

Slide 31


Smart Digit Example
DNC
36 57.82 N COG:
076 20.18 W SOG:
16 MAR 01
Locate nearest shoal water
36 58.34 N RNG 0.76 NM
076 20.86 W BRG 313.6

Slide 32



This is a great FFD example as it shows how effectively you can use attribute information for mission planning. This shows not only the existence of the road, but the quality of the data, type of road surface (weight-bearing ability), measurement of the road, etc. A single click provides all of this information!